
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Leavenworth Hatchery Complex

BPA project number: 20058

Contract renewal date (mm/yyyy): ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding

Bureau of Reclamation

Business acronym (if appropriate) BOR

Proposal contact person or principal investigator:

Name Dave Lynholm

Mailing Address P. O. Box 620

City, ST Zip Grand Coulee, WA 99133-0620

Phone 509-633-9501

Fax 509-633-9138

Email address dlynholm@pn.usbr.doi.gov

NPPC Program Measure Number(s) which this project addresses

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references

Short description

The Leavenworth Fish Hatchery Complex provides mitigation for for fish losses as a result of the construction of Grand Coulee Dam. It has 3 hatcheries, Leavenworth, Enitat and Winthrop.

Target species

Chinook Salmon, Steelhead Trout

Section 2. Sorting and evaluation

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input checked="" type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input type="checkbox"/> Research & monitoring <input checked="" type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
				Total	0.00%

Schedule constraints

Completion date

Section 5. Budget**FY99 project budget (BPA obligated):*****FY2000 budget by line item***

Item	Note	% of total	FY2000
Personnel		%0	
Fringe benefits		%0	
Supplies, materials, non-expendable property		%0	
Operations & maintenance	Contract of O&M w/USFWS	%100	630,000
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags:	%0	

Travel		%0	
Indirect costs		%0	
Subcontractor		%0	
Other		%0	
TOTAL BPA FY2000 BUDGET REQUEST			\$630,000

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
Bureau of Reclamation	Reclamations share of O&M increase (non power)	%30	272,000
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			\$902,000

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$5,184,717	\$6,208,796	\$6,321,920	\$4,609,937

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

PART II - NARRATIVE

Section 7. Abstract

Section 8. Project description

a. Technical and/or scientific background

Chinook Salmon

Complex chinook salmon originated from commingled upriver stocks intercepted at Rock Island Dam (1940-1943) and imports from the lower Columbia River (1942) and McKenzie River, Oregon (1941). The early imports were part of homing studies, and few if any contributed to future production. Since then, the hatcheries have imported eggs from several other Columbia River drainage hatcheries. Fish and eggs have not been imported to Entiat and Leavenworth since 1983 and since 1990 to Winthrop.

Steelhead Trout

Although not well documented, it is believed that steelhead at Leavenworth NFH first descended from the original stock collected at Rock Island Dam (1940-1943). To restart the steelhead rearing program in the late 1970's, Leavenworth obtained eggs from Washington Department of Wildlife. Since then returning fish have been used for broodstock, except in 1990 when the hatchery imported steelhead fingerlings from Wells State Fish Hatchery on the Columbia River in Washington state.

Project Description

Technical and/or Scientific Background

Spring Chinook

Complex bound adult spring chinook salmon leave the Pacific Ocean in March through April of each year. Adults are collected via hatchery fish ladders and holding ponds in late-May through mid-June with some fish entering Complex fish ladders as late as early July. Spawning occurs from mid-August until early September. Numbers of adult spring chinook salmon returning to each hatchery by return year are presented in Appendix A1.

Eggs hatch by mid-December, and fry are ready for outdoor rearing by the following February. Rearing continues for an additional 15 months, after which the young are released as yearlings directly into the Entiat, Icicle, or Methow Rivers, depending on the hatchery of origin. Prior to 1988, some fish were released in other rivers. Entiat also raises approximately 400,000 age-0 fingerlings released in May of their first year of life. Appendices A2-A5 show total releases of yearling and age-0 spring chinook salmon from the hatcheries by release year. Numbers of chinook salmon released have been reduced during the past 3 years in efforts to improve quality and return rates of the salmon through lowered rearing densities. Data from studies at other hatcheries have demonstrated that lower rearing densities result in higher return rates of adults. Also, drought conditions and declining ground-water levels have reduced water availability in recent years. Fish production plans and U.S. V. Oregon production goals for the Complex for 1994-1998 are presented in table 1. The production deviations below U.S. V. Oregon goals have been negotiated through PAC; however, the original goals are still valid.

Spring chinook salmon runs are established for Entiat and Leavenworth NFH=s. In past years, Leavenworth has had harvestable surpluses allowing for significant sport (Appendix A6) and Tribal (Yakama Indian Nation) fisheries (Appendix A7). The Icicle Creek - Wenatchee River spring chinook fishery is among the largest remaining sport harvest opportunities for this species in the Columbia River Basin. Washington Department of Fish and Wildlife manages and monitors the spring chinook sport harvest, and the Yakama Tribe monitors their fishery. In recent years, escapement to Leavenworth NFH racks has exceeded broodstock needs. Excess fish are distributed among the Yakama Tribe, Bureau of Indian affairs, and Trout Unlimited (Appendix A8). There was a small sport harvest on the Entiat River in 1986 and 1987; a total of 38 fish were caught. In other years, there has not been a sufficient adult return to the Entiat River to allow for a sport harvest. However, adult returns to Entiat have been sufficient to meet broodstock needs since 1983. Winthrop often does not have enough returning fish to meet broodstock needs and is supplied with varying numbers of fertilized eggs, usually from Leavenworth NFH. Winthrop last received eggs from sources outside of the Complex in 1989.

The Complex often receives requests for eggs or fish from other entities for stocking, research, or educational purposes. If excess eggs or fish are available and other criteria are met, the request is usually approved.

Ocean harvest for mid-Columbia River spring chinook stocks is probably limited to incidental catch and is likely less than 10 percent. Increased tagging of Complex fish in recent years should yield a better estimate of the contribution of these fish to ocean and in-river fisheries.

Summer Steelhead

Each year Leavenworth NFH collects about 80 returning summer steelhead adults from icicle Creek in March and April (Appendix A9). Spawning occurs on 1 or 2 days in early May. Approximately 125,000 eggs from around 40 females are collected and the progeny reared for 2 years. After 2 years, about 100,000 adipose-clipped smolts are released in mid-April into Icicle creek. Data on the number, size, and release sites for steelhead from Leavenworth NFH are listed in Appendix A10. Harvest of Leavenworth NFH steelhead is unquantified but occurs in the Columbia River, Wenatchee River, and Icicle Creek.

Fish Production Plans for the Complex, 1994-1998

SPECIES	ATTRIBUTE	LEAVENWORTH NFH	ENTIAT NFH	WINTHROP NFH
Spring Chinook	Yearling Production			
	- original goal	2,200,000	800,000	1,000,000
	- planned release	1,625,000 ^{1/}	400,000 ^{1/}	800,000 ^{2/}
	- size	16-18 Per Pound	16-18/Pound	16-22/Pound
	- release time	Mid-April	Early April	Early April

	- release site	Icicle Creek	Entiat River	Methow River
	Subyearling Production			
	- original goal	None	None	None
	- planned release		400,000	
	- size		30 per pound	
	- release time		Mid-May	
	- release size		Entiat River	
	<u>Adult Escapement</u>	<u>1,500 Maximum</u>	<u>650 Maximum</u>	<u>800 Maximum</u>
Summer Steelhead	Yearling Production		None	None
	- original goal	100,000		
	- planned release	100,000		
	- size	7 Per Pound		
	- release time	Mid-April		
	- release site	Icicle Creek		
	<u>Adult Escapement</u>	<u>80</u>	<u>None</u>	<u>None</u>

^{1/} Planned production based on maximum number of smolts that can be produced given current water quality/quantity concerns

^{2/} Winthrop production reduced from 1.0 million due to inadequate well water and fish disease problems with spring and river water

HATCHERY CONSTRAINTS AND MAJOR SITE CONCERNS

The Complex hatcheries sometimes have difficulty in meeting production and mitigation goals because of inadequate supplies of cool disease-free water, outdated and dilapidated rearing ponds, poor adult holding and handling facilities, and a lack of detailed site-specific evaluation of hatchery operations. These problems are compounded by other human activities such as manipulation of water in the Columbia River basin, habitat degradation, and resource allocation. Each station has site-specific problems that need to be addressed. Following are some of the major issues that need resolution.

Entiat NFH

The hatchery relies on ground water to rear quality fish. Ground-water supply is inadequate to meet production goals and address fish health needs. This problem limits production to 400,000 yearlings and 400,000 age-0 fish instead of the 800,000 yearlings goal. Age-0 fish are not expected to contribute as well as yearlings.

Leavenworth NFH

Inadequate water supply is a major problem, especially in July and August. The hatchery is only able to obtain slightly more than half of its water rights due to upstream diversion and lack of sufficient well water. Inadequate plumbing and antiquated and inefficient rearing ponds also limit fish production. Predatory birds taken an unknown but potentially significant number of juvenile fish each year.

Winthrop NFH

The shortage of disease-free water is a serious problem at this station. Winthrop NFH has been plagued with disease problems related to its use of Methow River water. Fish health biologist recommend rearing the fish on only ground water for most of the year. Unfortunately, current ground-water resources are not sufficient to meet production requirements. Another serious problem is the lack of adequate adult holding and spawning facilities. Construction of the current adult facility was not completed and may contribute to some adults not entering the ponds and straying into river spawning areas where they may affect natural stocks and impact the Methow State Fish hatchery broodstock program. Bird predation was a major problem in past years but is being alleviated by new covers for the rearing areas.

All Complex Hatcheries:

Hatchery Evaluation

Few studies have been undertaken to evaluate operations at Complex hatcheries. Although current hatchery practices are based on the best available knowledge concerning the culture of anadromous salmonids, further evaluation is needed in certain aspects. We believe that improvements in post-release survival may be gained through evaluations of alternative rearing

methods, fish health, and various release strategies. Minimizing potential interactions with wild fish is especially important with respect to ESA concerns.

Coded-Wire Tag Data

At all of the hatcheries there is a paucity of coded-wire tag data to evaluate program effectiveness. Coded-wire tags have been applied to selected groups of SCS at Leavenworth yearly since broodyear (BY) 1980, except BY 1982. Spring chinook salmon have been CWTed annually at Entiat and Winthrop since BY 1988 and 1989, respectively.

Hatchery Database

Historical hatchery data has not been validated or assembled into a usable format for evaluation. Past hatchery information needs to be assessed so informed decisions about hatchery operations and necessary hatchery evaluation can be determined.

HATCHERY EVALUATION

The effectiveness of the Complex in meeting its mitigation and production goals is measured by its ability to produce adults for harvest and meet spawning escapement needs. At the same time, the hatcheries must use cost effective and productive fish culture techniques and avoid detrimental practices that could alter genetic fitness of hatchery stock or negatively affect natural spawning populations. One purpose of hatchery evaluation is to evaluate how hatchery operations and release strategies affect post-release survival and adult returns. To date there have been few evaluation studies at Complex hatcheries.

Present evaluations occur through yearly monitoring programs and carefully selected multi-year studies. Evaluation needs are identified through a team effort (Hatchery Evaluation Teams) combining the expertise of MCRFRO, Complex staff, and Olympia Fish Health Center. Some of the evaluations identified by those teams are included in this plan. Other potential evaluations and the prioritization of evaluation needs could not be completed in time for inclusion into this plan.

The results of evaluation studies initiated and conducted by MCRFRO, Complex staff, and the Olympia Fish Health Center will be used to identify needed changes in hatchery operations. Although we have identified some potential future actions, funding, staff, and availability of fish will dictate which of these actions can be implemented. The anticipated funding for the period of 1994-1997 is not sufficient to initiate more than a few of the potential actions identified.

GOALS, OBJECTIVES, AND TASKS

We defined four main goals for the evaluation program. The objectives and tasks under each goal are sometimes similar. Actions that meet one goal may often contribute to meeting other goals. The four goals of the program are:

1. Evaluate the progress of Entiat, Leavenworth, and Winthrop NFH=s in meeting Complex mitigation goals and legal mandates.
2. Identify factors affecting smolt quality and survival to adult; effect changes in hatchery practices that positively affect those factors.
3. Facilitate inter and intraagency coordination and cooperation with hatchery production and evaluation programs in the Columbia River Basin.
4. Evaluate and strive to minimize the impacts of hatchery operations and production on natural/wild fish populations.

List of Appendixes Tables

- A1. Escapements of spring chinook salmon back to Entiat, Leavenworth, and Entiat NFHs, 1978 – 1993.
- A2. Entiat NFH spring chinook salmon released as yearlings and age-0s by release year, 1980 – 1993.
- A3. Leavenworth NFH spring chinook salmon released into Icicle Creek as yearlings and age 0's by release year, 1980 – 1993.
- A4. Leavenworth NFH spring chinook salmon released to sites other than Icicle Creek by release year, 1980 – 1993.
- A5. Winthrop NFH spring chinook salmon releases as yearlings and age 0's by release year, 1980 – 1993.
- A6. Sport harvest of Leavenworth NFH spring chinook salmon. Wild fish have been excluded from totals, except for 1980 when an undetermined number of wild fish were caught (Pettit 1991).
- A7. *Tribal harvest of Leavenworth NFH spring chinook salmon, 1987 – 1993***
(Pettit 1991).
- A8. Spring chinook salmon excessed from Leavenworth NFH to Yakima Tribe, Bureau of Indian Affairs, and Trout Unlimited, 1983 – 1993.
- A9. Leavenworth NFH steelhead trout escapements to the hatchery by return year, 1983 – 1993.

A10. Leavenworth NFH yearling steelhead trout releases into Icicle Creek by release year, 1979 – 1993.

Appendix A1. Escapements of spring chinook salmon back to Entiat, Leavenworth, and Entiat NFHS, 1978 – 1993.

Return Year	Leavenworth NFH	Entiat NFH	Winthrop NFH
1978			38
1979	1,822		102
1980	2,452	279	155
1981	2,420	247	399
1982	2,814	243	601
1983	3,090	600	755
1984	3,594	753	900
1985	6,635	912	1,201
1986	6,781	955	836
1987	4,275	901	594
1988	2,792	662	1,327
1989	2,683	651	195
1990	2,578	581	121
1991	2,271	435	92
1992	7,232	512	332
1993	4,952	730	646

Appendix A2. Entiat NFH spring chinook salmon releases as yearlings and age-0s by release year, 1980 – 1993.

Release Year	Yearlings Released	Age 0's Released	Total Released	Release Site
1980	658,100	0	658,100	Entiat River
1981	623,300	0	623,300	Entiat River
1982	997,900	0	997,900	Entiat River
1983	955,900	3,000	958,900	Entiat River
1984	645,458	150,000	795,458	Entiate River
1983	0	50,530	50,530	Naches River
1984	29,636	0	29,636	Naches River
1984	42,552	0	42,552	Yakima River
1985	894,631	0	894,631	Entiat Rver
1986	835,090	0	835,090	Entiat River
1987	925,000	0	925,000	Entiat River
1998	838,940	355,253	1,194,193	Entiat River
1989	791,263	116,145	907,408	Entiat River
1990	688,620	78,377	766,997	Entiat River
1991	818,707	78,377	897,084	Entiat River
1992	343,150	377,946	721,096	Entiat River
1993	376,462	332,178	708,640	Entiat River

Appendix A3. Leavenworth NFH spring chinook salmon released into Icicle Creek as yearlings and age 0's by release year, 1980 – 1993.

Release Year	Yearlings Released	Ago 0's Released	Total Released
1980	2,432,066	0	2,432,066
1981	2,380,787	0	2,380,787
1982	1,878,286	0	1,878,286
1983	1,906,488	0	1,906,488
1984	2,316,480	1,198,833	3,515,313
1985	2,190,000	52,800	2,242,800
1986	1,969,668	277,874	3,621,499
1987	2,336,868	1,284,631	3,621,499
1988	2,207,294	939,426	3,491,925
1989	2,239,677	1,044,000	3,146,720
1990	2,681,221	2,327,936	5,009,157
1991	2,258,034	768,808	3,026,842
1992	2,286,828	530,700	2,817,528
1993	1,757,925	0	1,757,925

Appendix A4. Leavenworth NFH spring chinook salmon released to sites other than Icicle Creek by release year, 1980 – 1993.

Release Year	Yearlings Released	Ago 0's Released	Total Released	Release Site
1980	589,600	0	589,600	Columbia River
1980	30,260	0	30,260	Yakima River
1981	400,221	0	400,221	Yakima River
1981	0	100,300	100,300	Naches River
1981	0	356,720	356,720	Columbia River
1982	400,000	0	400,000	Columbia River
1982	100,050	0	100,050	Naches River
1982	401,714	0	401,714	Yakima River
1983	361,500	0	361,500	Columbia River
1983	99,857	0	99,857	Naches River
1983	97,012	0	97,012	Yakima River
1984	0	310,000	310,000	Peshastin Creek
1984	0	312,818	312,818	Yakima River
1985	90,320	0	90,320	Peshastin River
1985	223,841	0	223,841	Yakima River
1985	280,511	0	280,511	Yakima River
1986	0	101,522	101,522	Yakima River
1987	317,483	0	317,483	Yakima River
1987	0	10,000	10,000	Yakima River
1988 - 1993	0	0	0	1/

1/ Leavenworth NFH has released SCS into only Icicle Creek since 1987.

Appendix A5. Winthrop NFH spring chinook salmon releases as yearlings and ago 0's by release year, 1980 – 1993.

Release Year	Yearlings Released	Ago 0's Released	Total	Release Site
1980	1,207,000	0	1,207,000	Methow River
1981	966,300	0	966,300	Methow River
1982	712,700	0	712,700	Methow River
1982	0	51,236	51,236	Twisp River
1983	953,508	363,200	1,316,708	Methow River
1984	621,881	281,300	903,181	Methow River
1985	1,167,625	0	1,167,625	Methow River
1985	37,477	0	37,477	Columbia River
1986	35,894	0	35,894	Columbia River
1986	1,062,794	0	1,062,794	Methow River
1987	35,273	0	35,273	Columbia River
1987	1,069,293	0	1,069,293	Methow River
1988	1,090,200	0	1,090,200	Methow River
1989	865,734	250,000	1,115,734	Methow River
1990	1,121,395	203,471	1,324,866	Methow River
1991	1,055,056	582,764	1,637,820	Methow River
1992	624,771	0	624,771	Methow River
1992	0	175,947	175,947	Methow State Hatchery /1
1993	950,624	0	950,624	Methow River

/1 Methow SFH released these fish into the Methow River.

Appendix A6. Sport harvest of Leavenworth NFH spring chinook salmon. Wild fish have been excluded from totals, except for 1980 when an undetermined number of wild fish were caught (Pettit 1991).

Return Year	Icicle Creek	Wenatchee River	Total
1980	213	173	386
1981	142		142
1982	100		100
1983	262		262
1984	429		429
1985	1,038		1,038
1986	1,243	365	1,608
1987	1,454		1,454
1988	946	630	1,576
1989	735	156	891
1990	456	431	887
1991	490	281	771
1992	775	991	1,766
1993	1,080	937	2,017

Appendix A7. Tribal harvest of Leavenworth NFH spring chinook salmon, 1987 – 1993 (Pettit 1991).

Return Year	Yakima Tribe	Bureau of Indian Affairs	Total
1987	1,044		1,044
1988	1,040	730	1,770
1989	1,184	320	1,504
1990	888		888
1991	519		519
1992	2,320		2,320
1993	5,216		5,216

Appendix A8. Spring chinook salmon excessed from Leavenworth NFH to Yakima Tribe, Bureau of Indian Affairs, and Trout Unlimited, 1983 – 1993.

Return Year	Yakima Tribe	Bureau of Indian Affairs	Trout Unlimited	Total
1983	252			252
1984	350			350
1985	3,340			3,340
1986	3,217			3,217
1987	1,351		250	1,601
1988	290	281	202	773
1989	172	185	184	541
1990	22	47	147	216
1991	10		25	35
1992	2,939	798	1,664	5,401
1993	1,465	952	722	3,139

Appendix A9. Leavenworth NFH steelhead trout escapements to the hatchery by return year, 1983 – 1993.

Return Year	Males	Females	Unknown	Total
1983				50
1984	101	67	0	168
1985	24	65	0	89
1986	24	21	0	45
1987	47	67	3	117
1988	47	80	0	127
1989	52	40	0	92
1990	16	20	0	36
1991	1	13	0	14
1992	44	23	0	67
1993	23	28	0	51

Appendix A10. Leavenworth NFH yearling steelhead trout releases into Icicle Creek by release year, 1979 – 1993.

Release	Yearlings Released
Year	
1978	37,803
1979	68,985
1980	135,850
1981	121,608
1983	106,890
1985	111,600
1986	45,578
1987	104,400
1988	77,118
1989	95,182
1990	106,034
1991	114,103
1992	119,275
1993	34,598

References

Pettit, L. 1991. Escapement estimates for spring chinook in Washington tributaries above Bonneville Dam, 1970-1991. Columbia River Laboratory Progress Report 92-18. WA Dept. of Fish., Battle Ground, WA.

b. Rationale and significance to Regional Programs

The Leavenworth Hatchery provides mitigation for fish losses above Grand Coulee Dam. It is estimated that 2% of the salmon migrated above Grand Coulee Dam prior to the dam being built.

c. Relationships to other projects

Facilitate Inter and Intraagency Coordination and Cooperation With Hatchery Production and Evaluation Programs in the Columbia River Basin.

Current Activities:

Objective 1. Coordinate and facilitate information exchange concerning Complex operations. This is an ongoing activity.

Task 1. Continue to develop, maintain, and update comprehensive hatchery databases including the files in the Columbia River Information System (CRIS).

Task 2. Ensure the CWT data is accurate and received by PSMFC and CRIS managers.

Task 3. Ensure fish release and return data is received in a timely manner by the Service, state, and managing committees.

Task 4. Actively participate on management and coordination committees in the basin that address fish passage and other fishery issues that impact hatchery fish.

Task 5. Cooperate with Washington Department of Fish and Wildlife to identify and resolve compatibility issues between Winthrop NFH and Methow State Fish Hatchery. Initial emphasis should be on adult straying and impact of egg transfers from other Complex hatcheries.

Objective 2. Actively participate on the Regional Hatchery Evaluation Team. This is an ongoing activity.

Objective 3. Serve as the Service's technical coordinator for all fish transfer and research oriented requests for fish produced at Complex hatcheries. This is an ongoing activity.

Objective 4. Develop and implement an egg/fish transfer policy between Complex stations.

Evacuate and Strive to Minimize the Impacts of Hatchery Operations and Production on Natural/Wild Fish Populations

Current Activities:

Objective 1. Meet our responsibilities under the Endangered Species Act. This is an ongoing activity.

Task 1. Update text and data in 5-year Biological Assessment concerning hatchery operations and production submitted to the National Marine Fisheries Service in October 1993.

Task 2. Further assess the influence of hatchery water withdrawals, effluent, and structures on petitioned and listed fish species.

Task 3. Provide information to aid in status determination of petitioned fish species in the mid-Columbia.

Potential Actions:

Objective 1. Mark all hatchery fish to facilitate differentiation between hatchery and wild/natural fish in the fishery, among hatchery returns, and in natural streams. This would be an ongoing activity.

Objective 2. Document types and degree of interactions between hatchery and wild/natural fish following release from the hatcheries. This will include a wide range of independent behavior, population structure, and migration studies, each involving at least 3 consecutive years of data collection and analyses.

Objective 3. Further assess compliance of Complex effluents with the Clean Water Act. This will be ongoing with an initial comprehensive analysis.

Objective 4. Document genetic difference between hatchery and wild/natural stocks at each hatchery and its associated watershed.

d. Project history (for ongoing projects)

The Bureau of Reclamation turned over funding and operation and maintenance of the hatchery complex to the USFWS in 1949 as the two entities agreed that Reclamation had fulfilled its obligation to restore to reconstruction levels the abundance of salmon resources jeopardized by the construction of Grand Coulee Dam. In 1991 the Department of Interior Inspector General, in his report No. 91-I-284, recommended that the Service develop an agreement with Reclamation to seek recovery of operation costs for the complex, as the required mitigation of adverse impacts of the project were not completed as of March 4, 1949, but continue indefinitely. The Secretary accepted this

recommendation and approved a budget entry for Reclamation to fund the costs to the Service of operation and maintenance of the Complex.

e. Proposal objectives

Provide base operation and maintenance costs for the Leavenworth Complex.

f. Methods

g. Facilities and equipment

Leavenworth:

Rearing facilities include two - 15 x 150 adult holding ponds, 45 - 8 x 80 raceways, 40 small and 22 large (not used) Foster-Lucas ponds, 72 troughs and 108 starter tanks. Hatchery water rights total 99,010 L/min, though average flow to the hatchery is 70,410 L/min. Water sources include seven wells, Icicle Creek, and Snow and Nada Lakes located in the Alpine Lakes Wilderness. Fry are reared on 100% well water for the first six months, at which time river water is introduced. A varied combination of both sources is used for the remainder of the rearing cycle. Up to 50% of the production is reared on 2nd use water for their final 12 months before release. Water quality and quantity are the primary factors limiting full production at this facility.

Entiat:

Rearing facilities include 40 starter tanks, 30 raceways and two dual purpose holding ponds. Hatchery water rights total 59,440 L/min, although only around 30,190 L/min are available for production. Water sources for the hatchery are the Entiat River, Limkiln Spring and six wells. Fish are reared on 100% spring/well water for up to 15 months, at which time river water is introduced. River water is used on a limited basis due to fish health concerns. During the final six months of rearing, 25% of production (yearlings) is placed on 2nd use water; 12.5% on 3rd use water, and the remainder on 4th pass water. All first use water is reserved for sub-yearlings. Water quantity and quality are the primary factors dictating production at this facility.

Winthrop:

Rearing facilities at Winthrop NFH include 34 starter tanks, 46 raceways, and 16 Foster-Lucas ponds. Hatchery water rights total 115,980 L/min and water use ranges from 33,050 - 107,280 L/min. Water sources include two wells, the Methow River, and one spring water source. Fish are reared on 100% well water for their first 14 months. For the final 3 to 5 months, depending on water availability, river water is gradually introduced until the fish are released. Water quantity and quality are the primary factors which limit full production at this facility.

h. Budget

This request is for additional funding that the Fish and Wildlife Service is requesting. The current approved FY 2000 budget for Leavenworth Fish Hatchery Complex is \$2,579,000. BPA's portion of this is \$1,805,000 and is currently funded under the Direct Funding Agreement. Original operation and maintenance estimates given to Reclamation and BPA were inadequate to meet the base operation and maintenance needs of the Leavenworth Complex.

Section 9. Key personnel

(Replace this text with your response in paragraph form)

Section 10. Information/technology transfer

The goals and objectives described under hatchery evaluations will help to better define the role and contribution that the Leavenworth Complex hatchery makes to anadromous fish populations in the Columbia River ecosystem. They will also help to manage the hatcheries more effectively and efficiently. Since funding and staff are limited and issues change daily, the Complex is in the continuing process of prioritizing evaluation projects most essential to addressing mandated mitigation responsibilities and current pressing fishery issues. The Complex realizes that a balance must be found between producing healthy fish that will survive to be adults while reducing the impact of hatchery production and operations on wild/natural fish stocks. Biologically sound evaluation of hatchery operations both on and off station will facilitate informed decisions regarding the management of hatcheries and fisheries on the stocks they produce.

The Leavenworth NFH Complex has identified an aggressive evaluation program primarily to be conducted by the Mid-Columbia River Fishery Resource Office of the Fish and Wildlife Service in cooperation with hatchery staff and the Olympia Fish Health Center. It is expected that the Leavenworth Complex will be able to demonstrate significant progress toward current activities within the next several years.

Congratulations!